



Accelerating solutions for highway safety, renewal, reliability, and capacity

Regional Operations Forum

Facilitating Goods Movement through Operations

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES

Session Overview

- What are “freight” operations?
- How can you facilitate goods movement?
- What are the emerging applications and technologies?
- How can you engage the private sector and partner agencies to collaboratively improve operations?



What are Freight Operations?



What are Freight Operations?




Last Mile



Long Haul

Who makes decisions about where goods move?

Decision Maker	Type of Decision	What Governs the Decisions?
Shipper	<ul style="list-style-type: none"> • Pick-up location • Drop-off location • Mode(s) • Gateways and transfers (ports, terminals) • routes and corridors • schedule 	<ul style="list-style-type: none"> • Total Logistics Costs • Regulatory Compliance 
Broker		
Consignee		
Trucker	<ul style="list-style-type: none"> • Some routing decisions • Where to park 	<ul style="list-style-type: none"> • Bottom line costs • Compliance (i.e. HOS) • Information on travel and routes

Why do we care about freight?

- Freight moves the economy
- Sustains major industries in your state or region
- Sustains domestic and international trade
- Truck VMT growing faster than passenger VMT

*Reliability / predictability
is top operations
concern of freight
industry*



Source:
Jeff Turner

What can agencies do to improve freight operations?

- Identify and mitigate operations issues
 - Recurring bottlenecks
 - Maintain fluidity
 - Safety hotspots
- Disseminate / integrate information
 - Road conditions
 - Truck parking
 - Truck routing
- Collaborate with the private sector



Florida DOT

What can agencies do to improve freight bottlenecks?

- Identify recurring bottlenecks
- Determine their cause(s)
- Prescribe and implement solutions

Constraint Type	Roadway Type	Freight Route
Lane-Drop	Freeway	Intercity
Interchange	Arterial	Urban
Intersection/ Signal	Local-Collector	Intermodal Connector
Roadway Geometry		Truck Access Route
Rail Grade Crossing		
Regulatory Barrier		

How to Identify Bottlenecks

- FHWA Data
 - FPM
 - NPMRDS
- Vendor Data
- Other reports
- Outreach
- Observation

Severe truck bottleneck in Central Puget Sound: I-5 southbound



- ▶ Location: I-5 southbound between NE 63rd St and NE Pacific Ave. E
- ▶ Length: 1.3 mile
- ▶ Daily Truck Volume: 11,000

- ▶ Average truck travel speed: 38 mph
- ▶ Percentage of travel speed below 35mph: 48%
- ▶ Travel Reliability:

Time Period	Reliability
AM	Unreliable
Midday	Unreliable
PM	Unreliable
Night	Reliably Fast

Washington State
Department of Transportation

WSDOT

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Truck Bottlenecks

Arizona State Freight Plan Example

- Compare free flow speed to daily or peak delay
- Identify types of bottlenecks
- Identify relationship to economic sectors
- Recommends actions to reduce truck bottleneck delays

Figure 15: Major Truck Bottleneck Locations along Arizona's Key Commerce Corridors

Map key	Highway	Segment Location	Direction	Major Contributing Factor				
				Congestion	Steep grades	Curves	Border crossings	Truck/local activity
A	I-17	Mile post 232 to 242 (within Black Canyon City)	Northbound		pm			
B	I-17	Mile post 298 to 306 (AZ 179 to Stoneman Lake Rd)	South		pm			
C	I-17	Mile post 329 to 331 (nine miles south of Flagstaff)	Northbound		mid			
D	I-10	At I-19 traffic interchange in Tucson	Both	am pm				
E	I-10	Within Wilcox area (milepost 36 to 40)	Both					am
F	I-19	Nogales Port of Entry	Both				mid	
G	SR 95	Within Lake Havasu City	Both	am pm				
H	US 95	San Luis Port of Entry	Both				am pm	

Truck Bottlenecks

Potential Mitigating Actions

Correct Capacity Deficiencies

- Low capacity left exits
- More through lanes

Shift or Reduce Facility Demand

- Managed lanes
- Multimodal investments

Implement Aggressive Incident Management

- Traveler information systems
- Queue warning system
- Quick clearance

Deploy Portfolio Approaches

- Multimodal strategies
(combination of strategies)

Freight Fluidity

Maintaining Reliable Access

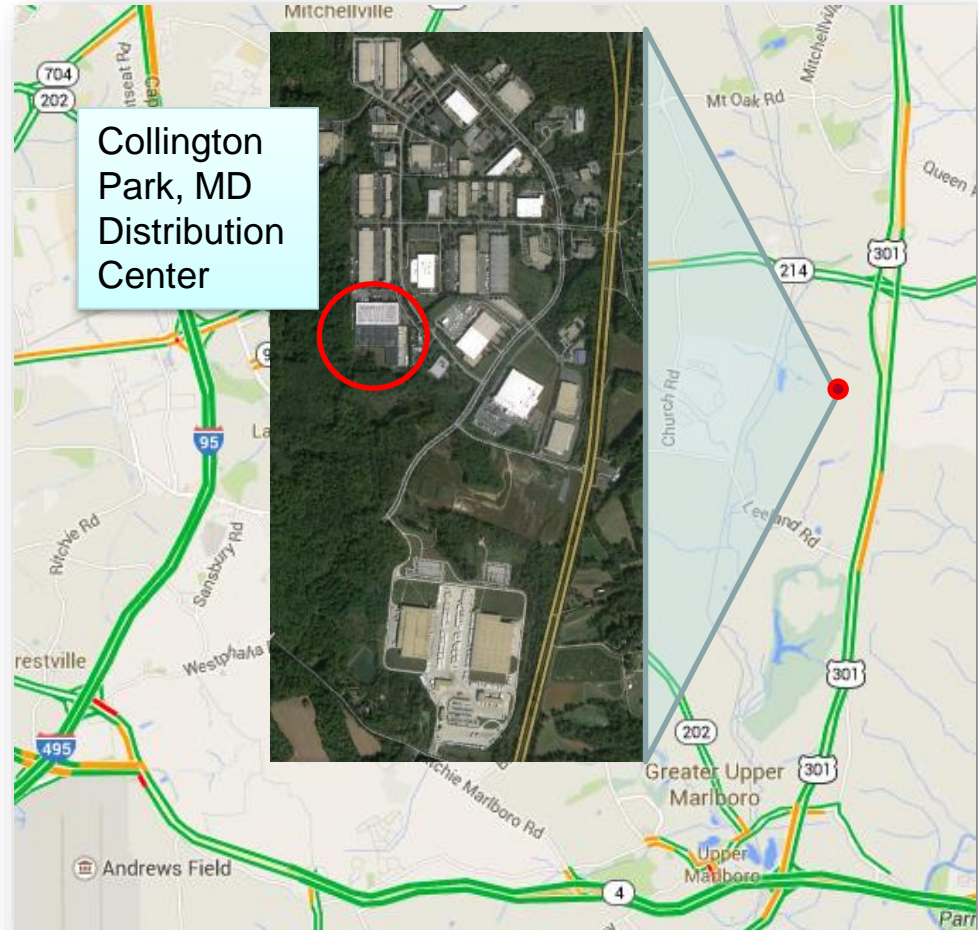
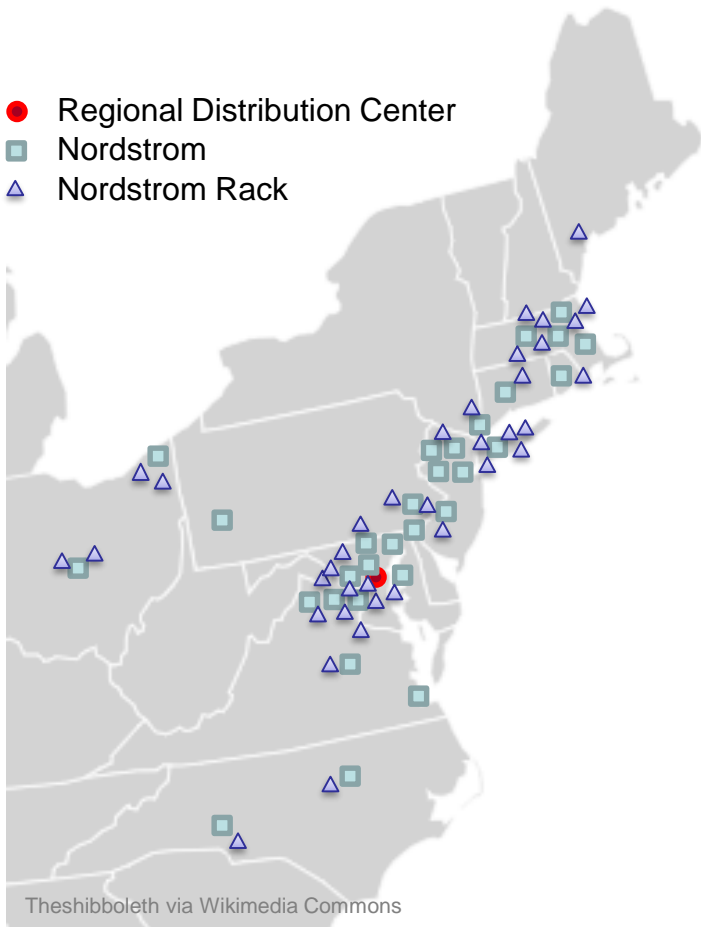
- Traffic operations works with freight planners & carriers to:
 - Identify the truck routes
 - Identify the major generators (e.g. airports, seaports, distribution centers)
 - Assess performance
- Implement measures to improve performance (e.g. signal timing, traveler information, etc.)



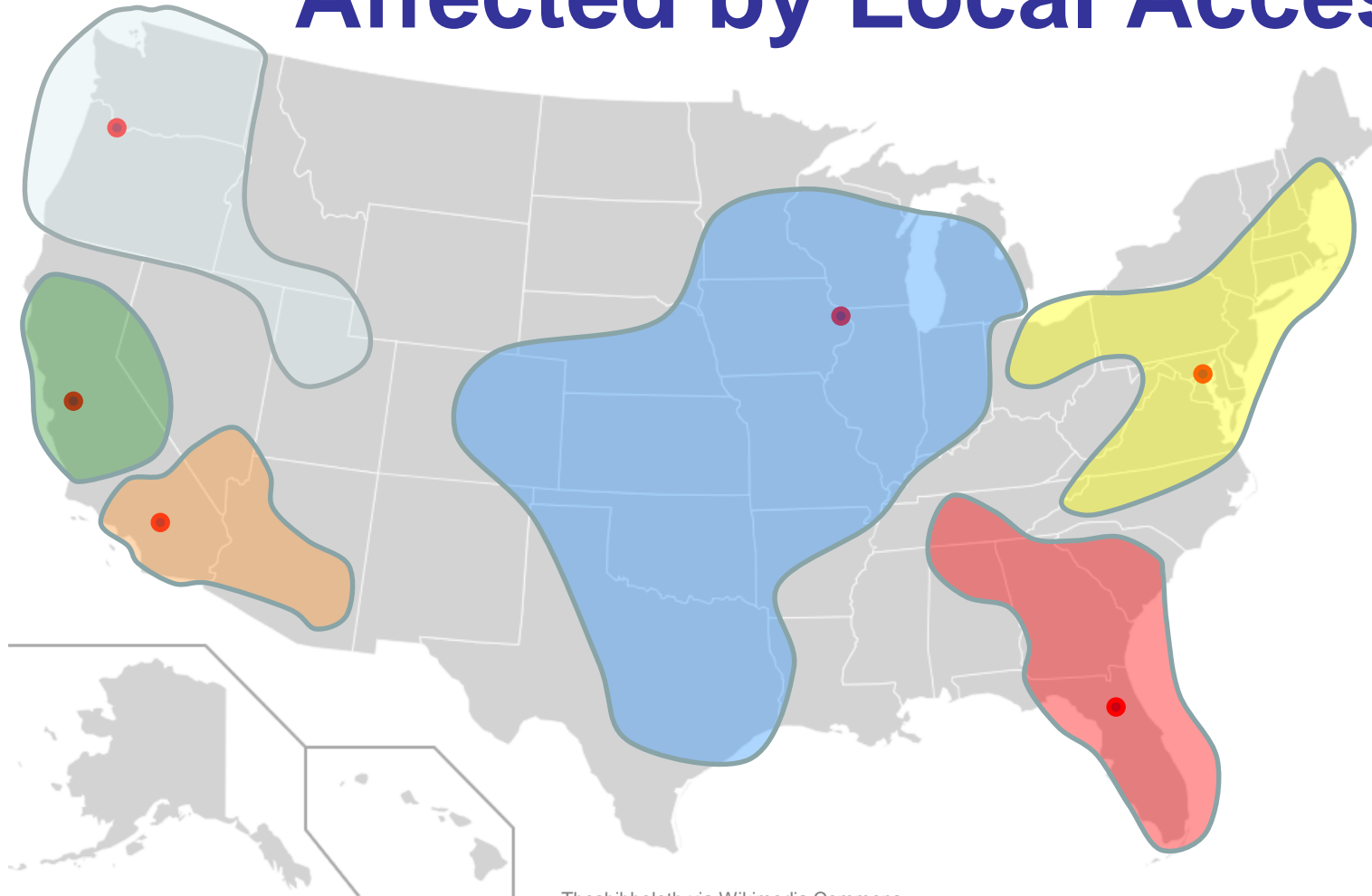
Florida DOT

Local Access to Nordstrom Distribution Center

- Regional Distribution Center
- Nordstrom
- ▲ Nordstrom Rack



Nordstrom D.C. “Sheds” Affected by Local Access



Theshibboleth via Wikimedia Commons

Incident Management

Aggressive Quick Clearance

- Contracts with heavy duty wreckers
 - Access to specialized equipment (e.g. air cushions for overturned trucks)
- Monetary incentives for rapid response
 - Georgia TRIP (Towing and Recovery Incentive Program)
 - Florida RISC (Rapid Incident Scene Clearance)
- Quick clearance laws and procedures



Incident Management

Florida Rapid Incident Scene Clearance (RISC)

- Started on Florida Turnpike in 2004, since expanded throughout Florida and to several states
- RISC Contractor operating parameters
 - a) 60 minutes to arrive at scene with required equipment
 - b) 90 minutes to clear the travel lanes and clear debris
- Contractor received \$2,500 bonus if a) and b) accomplished
- After 90 minutes, the contractor loses the incentive
- After 180 minutes, the contractor may be assessed liquidated damages



Incident Management Oversize / Overweight

- Contingency planning for OS/OW
 - Knowledge of OS/OW routes and shipment types
 - Best practices for clearance
 - Detour planning
 - Notification procedures
- Contracts with heavy duty wreckers
 - Access to specialized equipment (e.g. cranes)

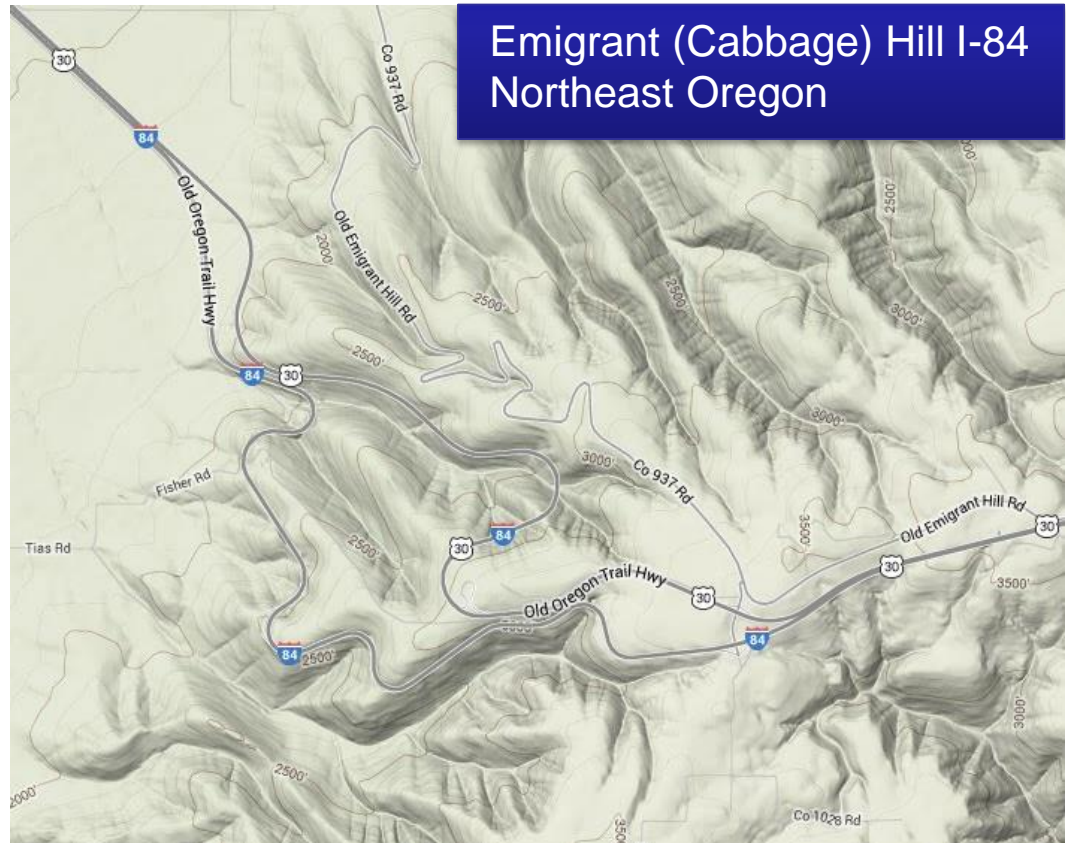


Oregon DOT

Safety Hotspots

Oregon Downhill Speed Information System

- 6% Grade
- 2,000' elevation change (9 miles)
- Double hairpin turn
- 51 truck accidents from 2003 to 2007 (31 truck at fault)
- 78% are out of state motor carriers

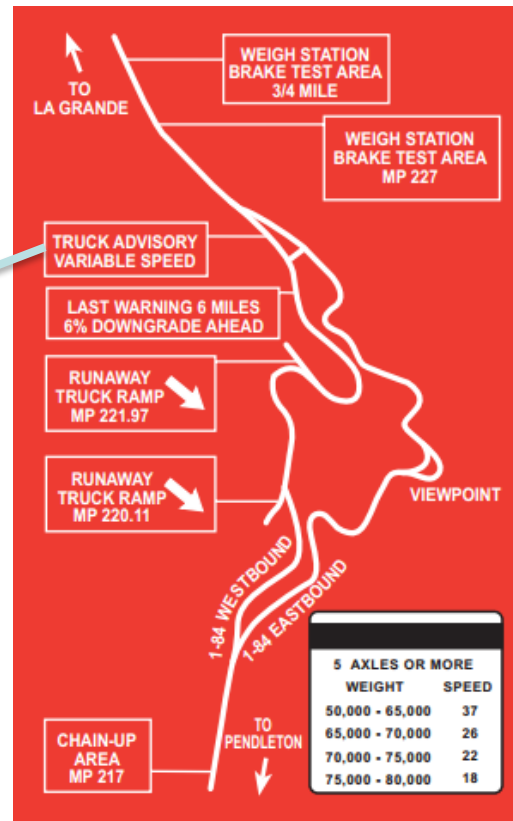


Safety Hotspots

Oregon Downhill Speed Information System



5 AXLES OR MORE WEIGHT	SPEED
60000 - 65000	37
65000 - 70000	26
70000 - 75000	22
75000 - 80000	18



- Upstream WIM relates weight to transponder in truck to issue advisory
- Public information campaign
- 13 percent reduction in crashes

Keeping Freight Informed

WSDOT Trucking and Freight Alert

Short-Term Closures, Incidents, Construction Projects



E-Mail or SMS/Text Message

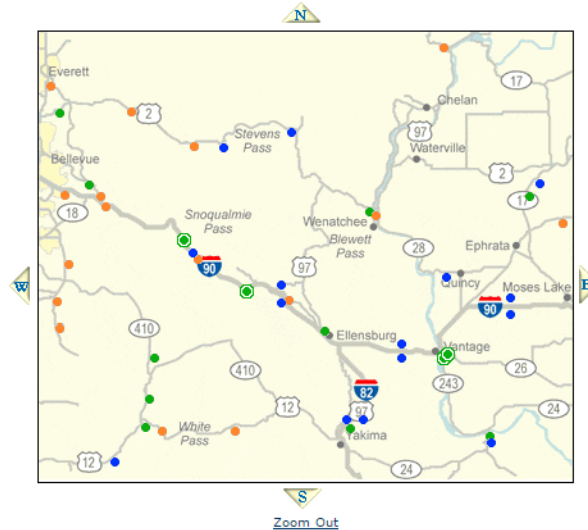


I-90 Both Directions - Snoqualmie Pass:

One hour rock blasting closures scheduled Thursday at 7 p.m. Reopening time depends on the amount of debris that comes down and the slope stability. Crews will close the pass eastbound at Gold Creek, milepost 56, and westbound at Price Creek, milepost 61. No services past exit 53 eastbound and exit 70, westbound during closures. Last Updated: 8/14/2013 8:18 PM

Keeping Freight Informed

WSDOT Real Time Restrictions



Zoom in on the map to view more routes.

If you do not see the route you are looking for,
no problems have been reported.

Interstate: **I-90**

US Highways: **US 2 US 12**

State Highways: **SR 9 SR 10 SR 17 SR 28 SR 123 SR 153 SR 162
SR 165 SR 169 SR 202 SR 203 SR 243 SR 285 SR 410
SR 522 SR 821**

[View all routes](#)

- Recent bridge restrictions added in the last 10 days
- Bridge restriction
- Recent road restrictions added in the last 10 days
- Road restriction
- Rest area

Oversize/Overweight Restrictions	
Showing 8 of 38 Restrictions	Printer Friendly
I-90, MP: 78 to 88, Direction: Both	
New	<p>Date Updated: 5/8/2015 11:04 AM Original Date: 5/8/2015 12:00 AM Effective Monday, May 11th-Thursday, May 14th on I-90 mileposts 78-88 both directions. Westbound: No loads over 12' wide Monday, May 11 from 7am to 4pm. Eastbound: No loads over 12' wide, Tuesday, May 12 through Thursday, May 14, from 7am to 4pm each day.</p> <p>More</p>
I-90, MP: 56 to 64, Direction: E	
New	<p>Date Updated: 5/8/2015 10:47 AM Original Date: 5/8/2015 12:00 AM CURRENT RESTRICTION (5/8 - 5/17) - Eastbound: No loads over 12' wide Friday and Saturday nights, May 8 and 9, and Monday through Friday nights, May 11 through May 15, from 8pm to 9am the following morning. Sunday, May 17 from 6:30am to 1:30pm: No loads over 16' wide. No restrictions westbound.</p> <p>More</p>
I-90, MP: 137, Direction: Both	
New	<p>Date Updated: 5/8/2015 8:43 AM Original Date: 5/11/2015 12:00 AM I-90, Vantage Bridge, both directions - No loads over 14' wide from 6am-6pm each day, Monday, May 11 through Friday, May 15 and Monday, May 18 through Thursday, May 21.</p> <p>More</p>
I-90, MP: 137 to 138, Direction: E	
New	<p>Date Updated: 5/8/2015 8:38 AM Original Date: 5/26/2015 12:00 AM ADVANCE RESTRICTION NOTICE - Eastbound Only Beginning Tuesday, May 26 through November 1: No loads over 14' wide 24 hours per day, 7 days a week. Possible detour route available via I-82, I-182, and US 395.</p> <p>More</p>
I-90, MP: 136.22 to 138.41, Direction: Both	
New	<p>Date Updated: 5/6/2015 8:32 AM Original Date: 6/1/2015 12:00 AM Effective June 1st-5th from 7:30am to 3:30pm daily. No loads over 10' wide allowed. WSDOT crews will be conducting a bridge inspection at this time.</p> <p>More</p>

- WSDOT Commercial Vehicle Website
- Highlights most recent restrictions (bridge and road)

Truck Parking National Shortage

- Severe shortage of safe, legal parking options
 - Nearly half of trucker search an hour daily
- 2.2 million registered long-haul trucks in U.S.
- US DOT, state DOTs, and private sector working to improve information and allocation of spots



Truck Parking

State Initiatives: UDOT Truck Parking Program



Truck Parking

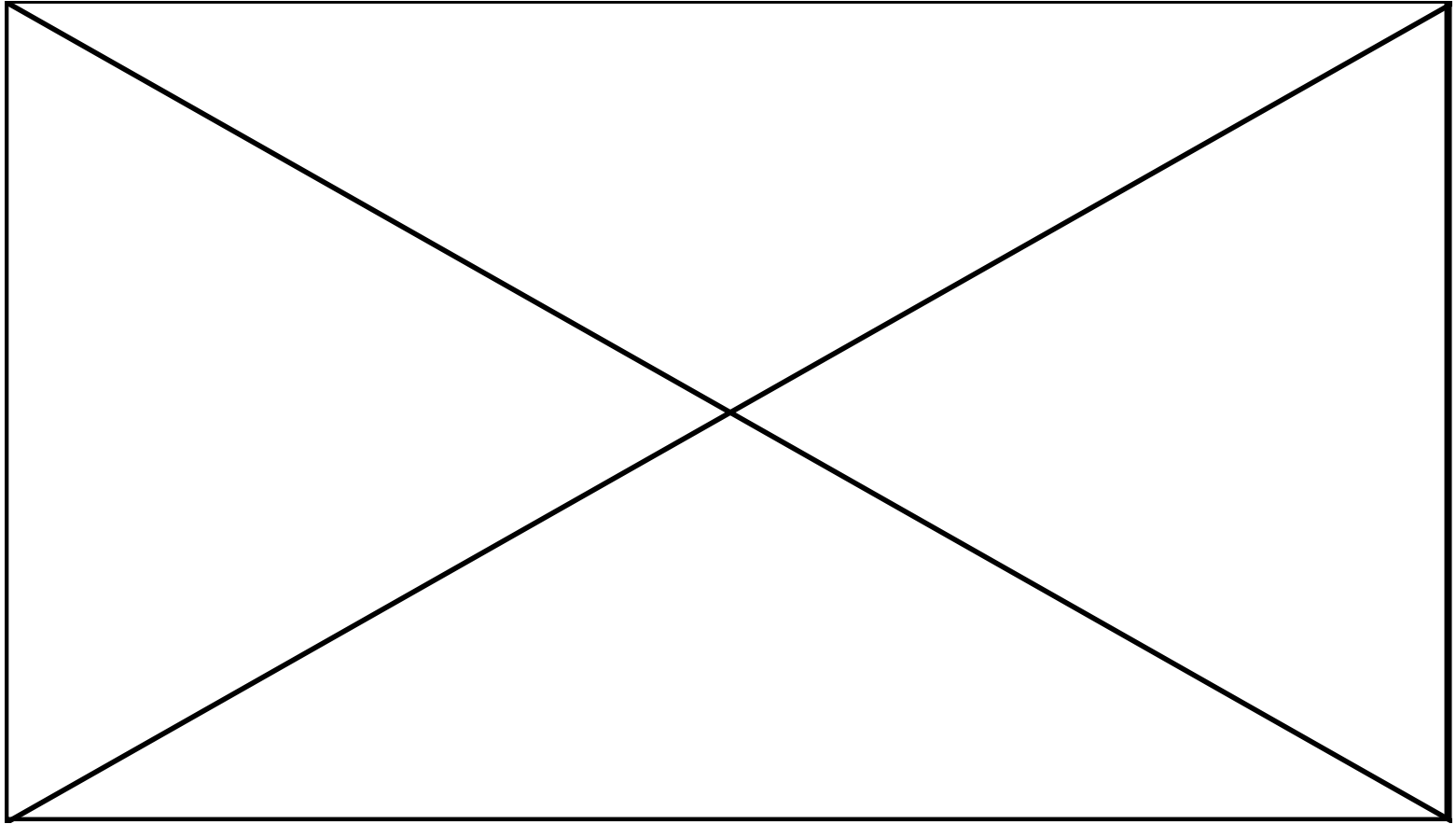
State Initiatives: Mn/DOT

- Minnesota Truck Parking Availability Study
 - U of MN demonstrated automated truck stop management system at three MnDOT rest areas on I-94
 - Cameras determines the number of occupied parking spaces at MnDOT) safety rest areas and relay information to drivers through website, in-cab messaging, message signs



Truck Parking

Minnesota Truck Parking Availability Study (Video)



Truck Parking Reservation Systems

[ABOUT](#)[FIND PARKING](#)[CONTACT](#)

Find Parking

LOCATION

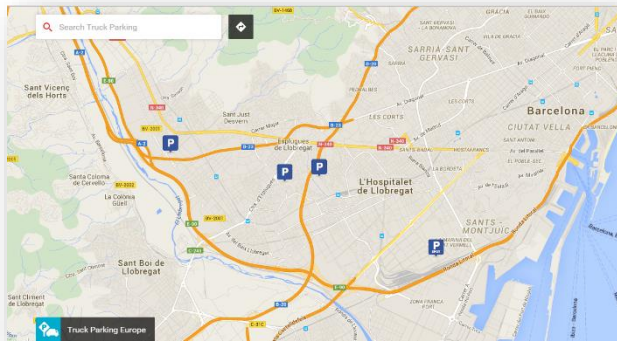
AVAILABILITY

☒ Show only lots with
availability



Truck Parking

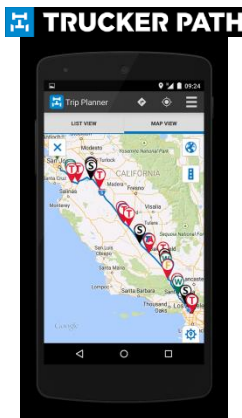
Crowdsourced Information



- Constantly growing free database (claims to be largest in Europe)
 - 18,000 truck parking spaces
 - Differentiates between parking areas (5 spots in a contiguous space) vs. parking spots
- "Please note that the app only provides a platform for data which is essentially generated by the users of the app."
 - Owners of truck parking can join a “verified program” that blocks the community from editing information about the spots
 - Users can rank the spots and comment on them

Truck Parking

Crowdsourced Information

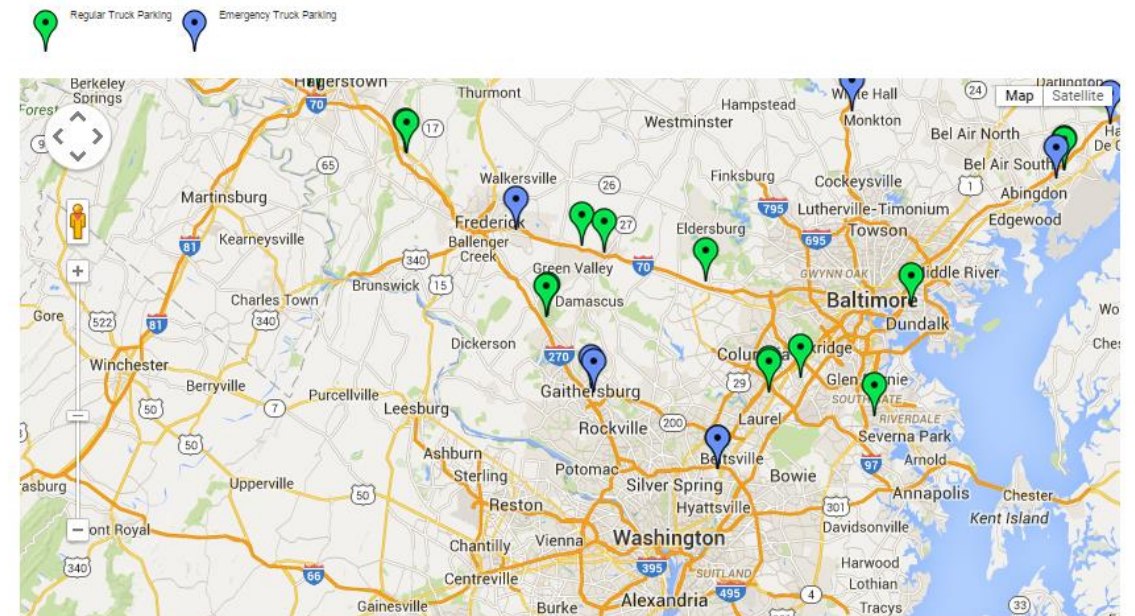


- Trucker Path
 - Allows users to input truck parking availability at truck stops and other locations across U.S.
 - Detects when trucks are at a stop
 - 200,000 users
- Telogis Route Planning App
 - Crowd sources parking information
 - Integration of route planning / HOS
 - 140,000 users

Truck Parking

Emergency Truck Parking

- Maryland State Highway Administration'
 - Allows for emergency truck parking in select Park and Ride lots if more than 6" of snow falls



Truck Parking

Emergency Truck Parking: Regional Cooperation

- Weather events require regional cooperation
 - Truckers need to know where to part and wait during an extreme event (e.g. highway closed in Montana).
- I-80 Winter Operations Coalition
 - California and Nevada (and the other states of the I-80 Winter Weather Corridor) coordinate closures.
 - Nevada is working with municipalities to identify truck parking when roads are closed in California (Sierra Nevada passes).



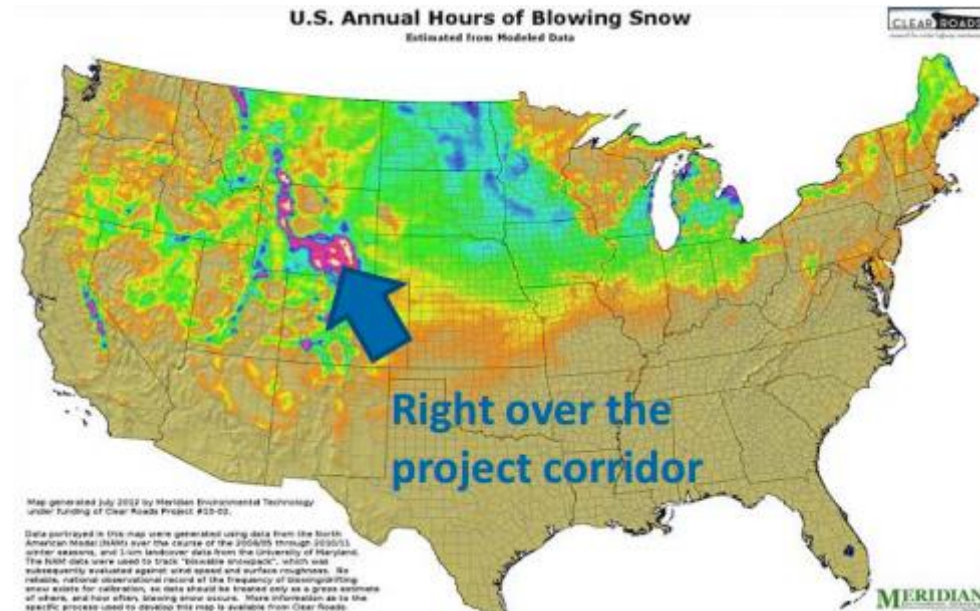
Connected Trucks

- U.S. DOT Safety Pilot Model Deployment includes trucks (Fall 2012 to Fall 2013)
- 3 trucks integrated with wireless crash warning devices
- Driver clinics with a cross section of commercial drivers. that will be part of separate truck driver clinics.
- Closed-course environment



Connected Trucks: USDOT CV Pilot Wave 1 Wyoming I-80

- Objective: Reduce the number of weather related incidents (including secondary incidents) in the corridor
- High elevation corridor
- Oct-May blowing snow and poor visibility
- 3,470 high wind crashes from 2002 to 2010



Connected Trucks: USDOT CV Pilot Wave 1 Wyoming I-80

- Vehicle to infrastructure (V2I) and vehicle to vehicle (V2V) connectivity to connect:
 - snow plows
 - trucks
 - fleet management centers
 - roadside equipment
- Provide real-time advisories both to trucks and personal vehicles en-route as well before entering the I-80 corridor.
- Applications will support roadside alerts, parking notifications, dynamic routing guidance, weather responsive variable speeds





Autonomous Trucks

Nevada Pilot

- Daimler Freightliner “Inspiration” to test on Nevada state highway and interstates
- “Highway Pilot” intelligent system functions like auto pilot in an airplane
- The technology is ahead of the legal framework
 - How is accident liability established?
- Financially viable when a corridor of states allows the vehicle
 - The potential for platooning is a huge incentive

Freight Advanced Traveler Information System (FRATIS)

1. Freight Real-Time Traveler Information with Performance Measures



- Provides traveler information to freight operators and drivers:
 - real-time travel estimates with route guidance to freight facilities,
 - basic incident alert, road closure and work zone information.
 - Could include oversize/overweight route restrictions with associated time periods
 - tailored weather information,
 - intermodal connection information,
 - container disposition / shipment schedule updates.
- Uses archived information for performance monitoring.

2. Freight Dynamic Route Guidance



- Determine, in real-time, and potentially while a truck is already on a route, the best route (or re-routing, if applicable) between freight facilities for each carrier that subscribes to the service.

3. Drayage Optimization



- Coordinate load movements between freight facilities. Trucks assigned time windows for pickup or drop-off Web-based forum for load matching to reduce empty or unproductive moves

FRATIS

Freight Advanced Traveler Information System

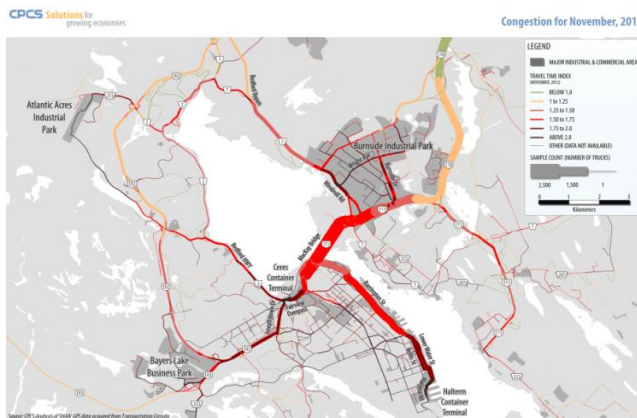
Pilot Region	Objectives
Los Angeles-Gateway	Addressing dynamic travel planning around the marine terminals and queues to move cargo out of the ports more efficiently with the use of an optimization algorithm
Dallas-Fort Worth	Optimize drayage opportunities in coordination with rail and local truck drayage companies.
South Florida	Similar focus as the other two sites, but includes emergency response capability to FRATIS that would integrate FRATIS functionality into Emergency Operations Center activity during an emergency such as a hurricane.

- Awaiting results from pilots
- Eventual OEM and private sector applications

The Next Big Thing

Big Data in Freight Operations

- Private sector is just getting started
 - 8% of shippers and 5% of 3PLs surveyed have implemented “Big Data” supply chain initiatives*
- Public sector utilizing big data (truck GPS) for performance, exploring other applications (e.g. regional operations).



“The major benefits from data come from answering unanticipated questions.”
- Peter Kivestu, Teradata

*From Jim Taylor “Fusing Big Data and the Supply Chain: The Future is NOW.” *Inbound Logistics* April 2014.) Source: 2014 18th Annual Third-Party Logistics Study produced by Dr. C. John Langley and Capgemini Consulting.

Stakeholder Outreach

How to integrate freight considerations into operations?

- MAP-21 Freight Advisory Groups (recommended)
 - Membership includes carriers, shippers, logistics providers
 - Involve ITS / operations staff
- Focus other efforts on matching the issue to the audience



Virginia Freight Transportation
Technical Advisory Committee (VFTTC)

Stakeholder Outreach



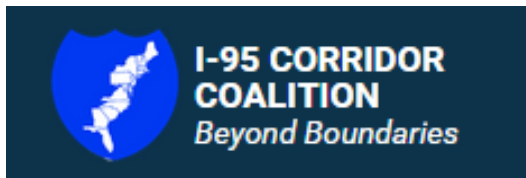
Goods Movement Task Force

- Goods Movement Task Force meets quarterly
 - Inform members of upcoming topics and high-interest issues
 - Make it the “place to be” for networking and information
 - Formal process to shape the planning and programming process (e.g. freight projects in the regional plan)

Working Together

Multi-Agency Cooperation

- Goods move across regions
 - Corridor and multi-state groups working together on freight operations
 - I-95 Corridor Coalition
 - Northwest Passage Corridor Coalition
 - Mid-America Freight Coalition



Public Agency Role

How can you facilitate goods movement?

- Understand the role of operations in goods movement
- Work with agency staff and private sector to identify “freight” bottlenecks and develop improvement strategies
- Identify and mitigate truck crash hotspots
- Improve freight-specific communications
- Improve truck parking and information on availability
- Get to know emerging technologies and applications
- Outreach with freight stakeholders to identify operations needs and work on improvements

Public Agency Role

How can you facilitate goods movement?

- Know what truckers and shippers think about operations.
- Know the key industries of your state and corridor and their needs (and supply chains).
- Develop “Freight Operations Implementation Plans” jointly with freight planning staff



Idaho Statewide Freight Study

Recommendation / Action Steps	Considerations
Promote appropriate use of ITS technologies and applications	Weigh-in-motion technologies Automated plate recognition Transponders GPS Smart phone applications Web-based applications

Questions and Discussion



Florida DOT